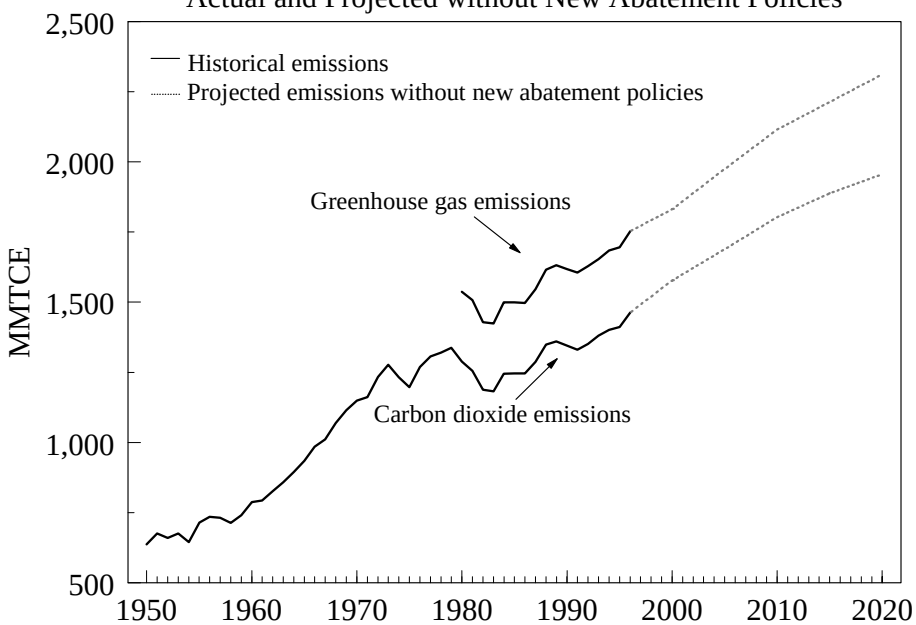
TRENDS IN GREENHOUSE GAS EMISSIONS

Historical Emissions

The increase in atmospheric concentrations of greenhouse gases reflects in part the growth in anthropogenic emissions of these gases. In the United States, emissions of carbon dioxide have increased more than 2 ½ times since 1950, and are projected to continue to increase over the next twenty years absent any new emissions abatement policies and efforts (see Figure 1). Most of the projected increase in domestic greenhouse gas emissions results from anticipated growth in carbon dioxide emissions; emissions of methane and nitrous oxide are likely to remain roughly flat over the next decade (Energy Information Administration 1997a; Climate Action Report 1997).[2] More than 98% of all carbon dioxide emissions in the United States

Figure 1. U.S. Greenhouse Gas Emissions,
Actual and Projected without New Abatement Policies



Sources: Energy Information Administration 1997a, 1998b; Climate Action Report 1997.

[2] A recent draft report by the Environmental Protection Agency (1998) indicates that N_2O emissions may have been higher in the past than previously reported, based on (continued...)

result from the combustion of fossil fuels (Energy Information Administration 1997b).[3] Although emissions of the synthetic gases, HFCs, PFCs, and SF_6, are projected to increase, they will still comprise only a small share of total U.S. greenhouse gas emissions in 2010 (Climate Action Report 1997).[4]

The pattern of emissions growth in the United States is similar to that of most other Annex I nations (see Figure 2) (Marland and Boden 1998).[5] In many cases, the emissions increases have tracked the output of these nations' economies. For example, the rapid development of Japan since World War II resulted in a large increase in carbon dioxide emissions in spite of that economy's high energy efficiency. Further, the nations of the Former Soviet Union have experienced a decline in their carbon dioxide emissions since the beginning of this decade because of the significant fall in economic output during their transitions to market economies.

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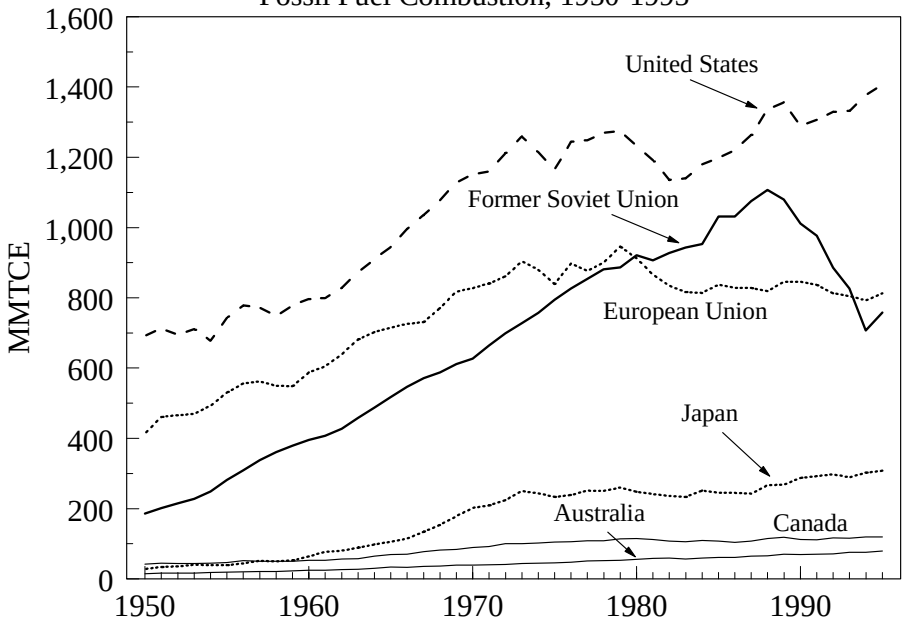
[2](...continued)
a new emissions accounting methodology. This analysis implies that future N_2O emissions may grow.

[3] Measures of carbon dioxide emissions from the Energy Information Administration and Marland and Boden (1998) do not include the effects of land use change (such as reforestation, afforestation, and deforestation) on total net emissions of carbon dioxide.

[4] Emissions of greenhouse gases are presented in terms of million metric tons of carbon equivalent (MMTCE). Carbon equivalence is based on the 100 year global warming potentials for greenhouse gases (see Table 2 for a review of global warming potentials).

[5] Annex I includes most of the world's industrial countries (see Appendix A for a description of Annex I and a list of these countries).

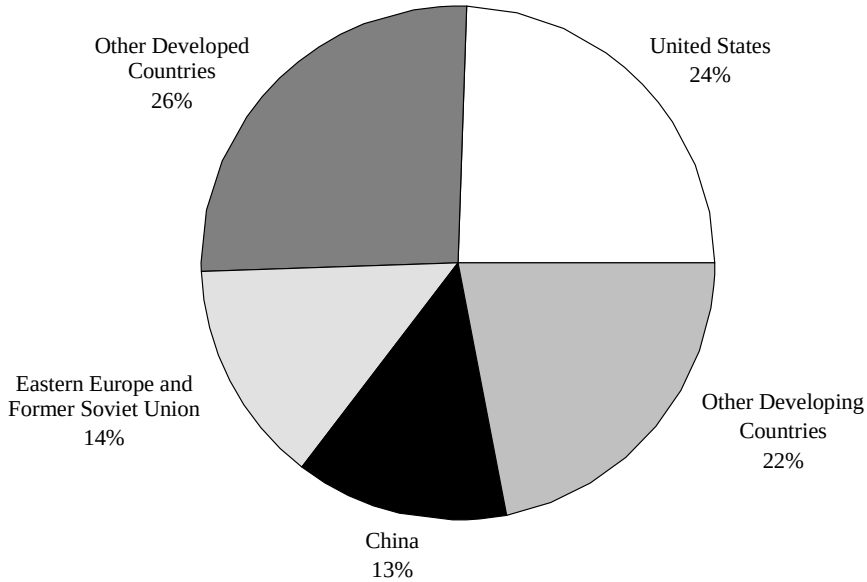
Figure 2. Major Annex I Countries' Carbon Dioxide Emissions from Fossil Fuel Combustion, 1950-1995



Source: Marland and Boden 1998.

In 1996, the industrial countries emitted a majority of the world's energy-related carbon dioxide. The United States emitted approximately 1/4 of the world's carbon dioxide from fossil fuel combustion (see Figure 3). China, the world's second largest emitter, had emissions almost equal to those of all of Eastern Europe and the Former Soviet Union. The industrial world's share of global emissions has declined over time as developing countries' economies have grown (Energy Information Administration 1998a).

Figure 3. World Carbon Dioxide Emissions from Fossil Fuel Combustion, 1996

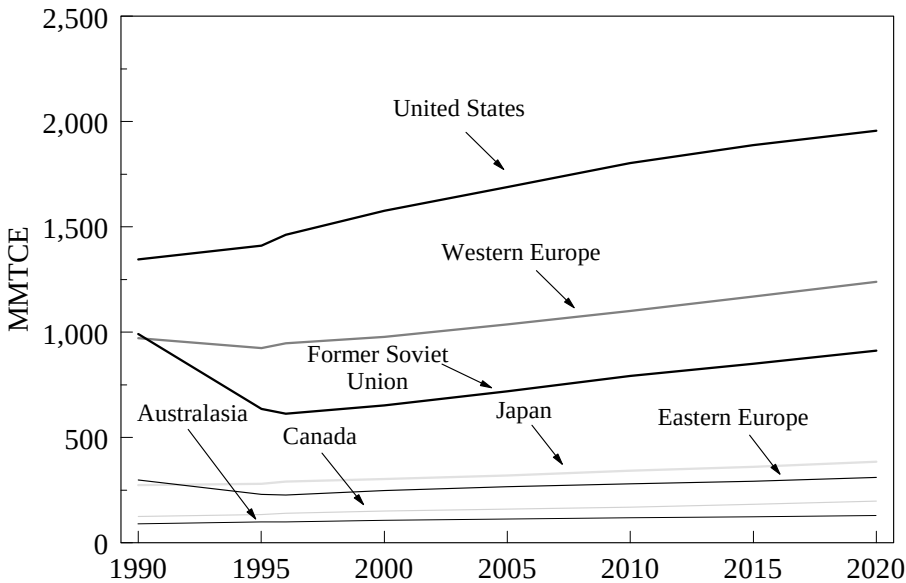


Source: Energy Information Administration 1998a.

Projected Emissions

Absent new measures to abate emissions in industrial countries, emissions of carbon dioxide will grow in all Annex I nations (see Figure 4).[6] The Energy Information Administration (1998a) projects that the United States will experience the largest absolute increase in emissions over the 1990-2020 period, while nations of the Former Soviet Union are not expected to achieve their 1990 carbon emissions level before 2020.

Figure 4. Projected Carbon Dioxide Emissions of Major Annex I Countries without New Abatement Policies

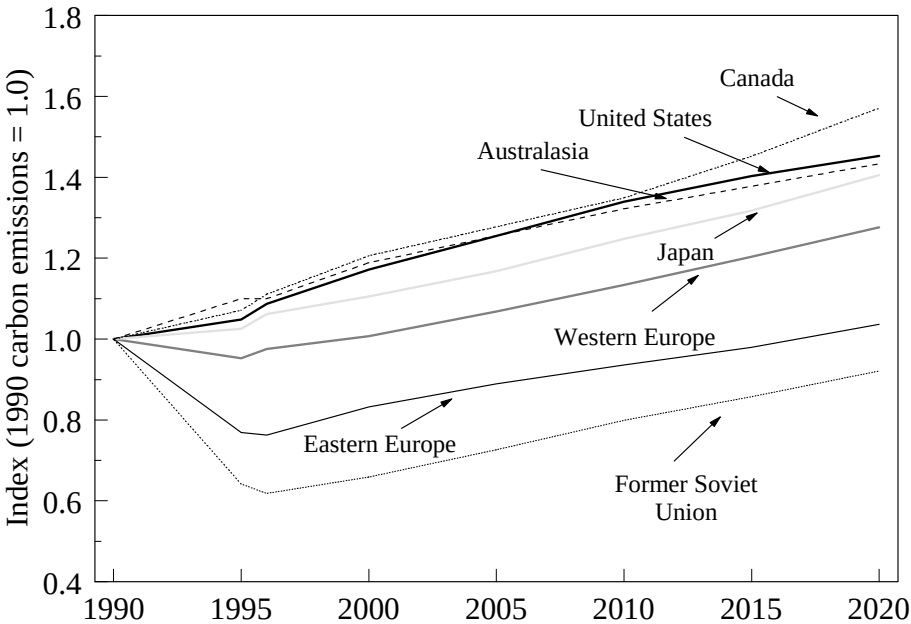


Note: Data represent carbon dioxide emissions from fossil fuel combustion.
Source: Energy Information Administration 1998a.

[6] The Energy Information Administration defines Australasia to include Australia, New Zealand, and U.S. Territories. Western Europe includes all of OECD Europe except for the Czech Republic, Hungary, and Poland.

The United States is projected to experience the second fastest rate of emissions growth among the major Annex I nations between 1990 and 2020 (see Figure 5). Canada is projected to experience the fastest growth rate. After declines in emissions during most of this decade, nations of the Former Soviet Union and Eastern Europe will also have comparable growth rates.

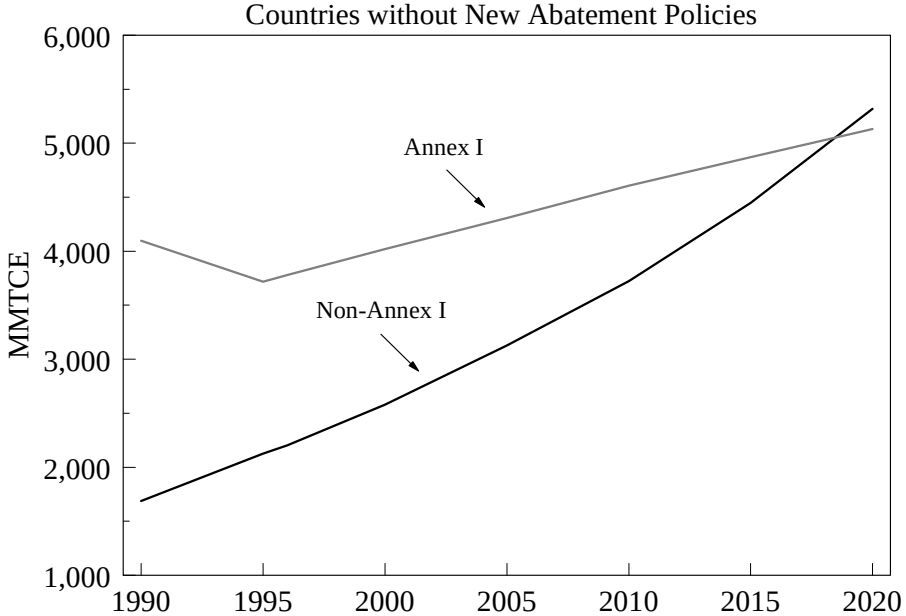
Figure 5. Projected Growth in Carbon Dioxide Emissions Among Annex I Countries without New Abatement Policies



Source: Energy Information Administration 1998a.

The Energy Information Administration (1998a) projects that Non-Annex I countries' emissions will surpass the emissions of Annex I countries between 2015 and 2020 (see Figure 6).[7]

Figure 6. Projected Emissions of Annex I and Non-Annex I Countries without New Abatement Policies

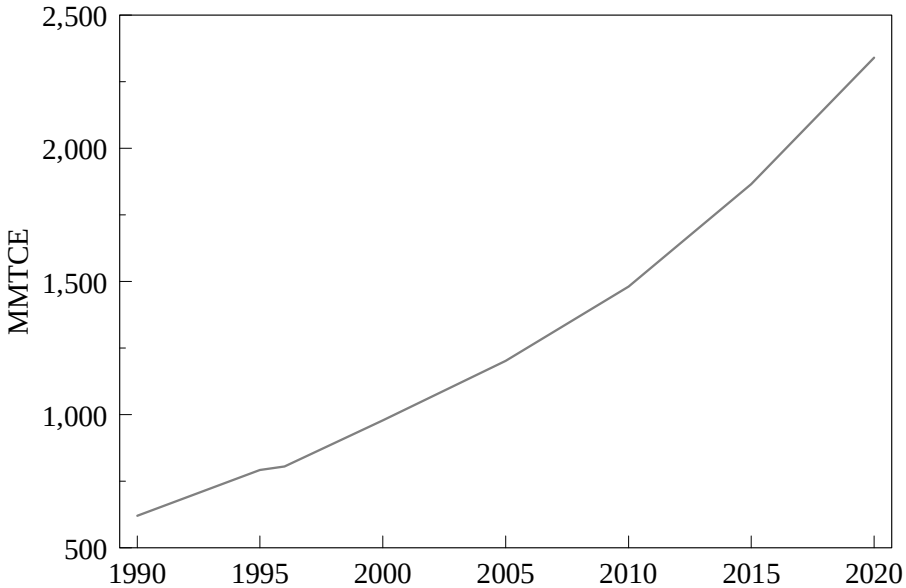


Note: Data represent carbon dioxide emissions from fossil fuel combustion.
Source: Energy Information Administration 1998a.

[7] See Appendix A for a discussion of Annex I and Non-Annex I countries.

According to projections, China will surpass the United States as the world's largest annual emitter of carbon dioxide around 2015 (Energy Information Administration 1998a). China's emissions will surpass 2 billion metric tons between 2015 and 2020 because of its expected rapid economic growth and its reliance on its vast coal reserves (see Figure 7).

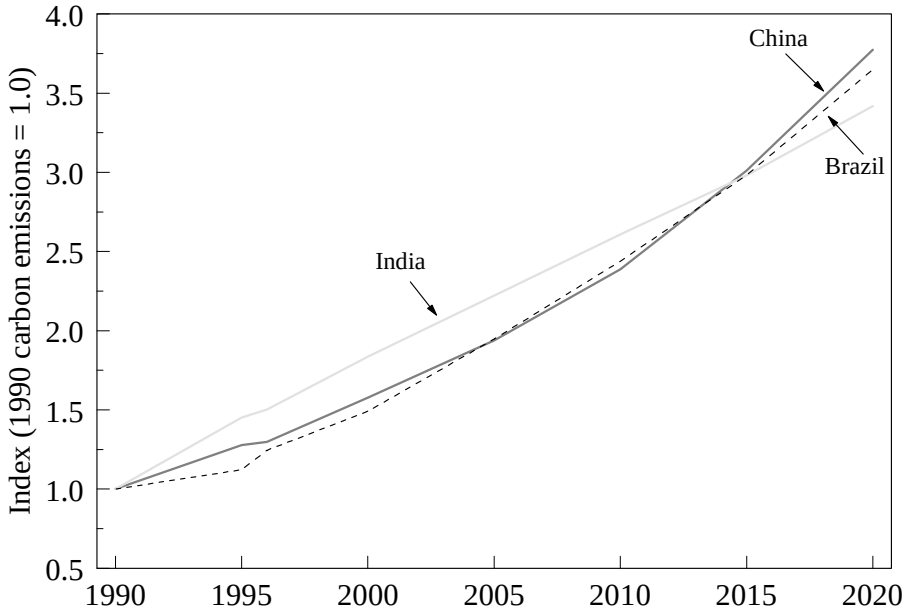
Figure 7. Projected Emissions of China without New Abatement Policies



Note: Data represent carbon dioxide emissions from fossil fuel combustion.
Source: Energy Information Administration 1998a.

The rapid increase in Non-Annex I emissions is not solely the result of rapid emissions growth in China. The emissions of several other large developing economies are also projected to grow at nearly the same rate (Energy Information Administration 1998a; see Figure 8).[8]

Figure 8. Projected Growth in Carbon Dioxide Emissions of Several Developing Countries without New Abatement Policies



Source: Energy Information Administration 1998a.

The projected growth in emissions of carbon dioxide and other greenhouse gases can increase atmospheric concentrations of these gases, and further accelerate climate change. The next section details the risks associated with continuing along the business as usual (BAU) emissions path.

[8] For additional country-specific energy and emissions data, refer to Appendix E.